

tangential pitting of autumnal tracheids. The change in the living pines is seen in the disappearance of thick-walled ray cells, the presence of large compound ray pits, the development of ray tracheids, and the loss of tangential pitting of autumnal tracheids. The type of hard pines represented by *P. resinosa* in North America and *P. silvestris* in Europe is "the most highly developed and specialized condition among living pines." The nut pines (of North America and Asia) have piciform lateral ray pits and thick-walled ray cells, and in these features they are the living pines that approach most nearly to the cretaceous pines. The hard pines of the United States, with the exception of *P. resinosa*, show a great range of variation from piciform to compound lateral ray pits; and the soft pines present a parallel series of gradations.—J. M. C.

Non-available water.—BOVIE¹³ has tested the effect of salts upon the non-available water in a soil of crushed quartz. Aside from a full nutrient solution of 0.2 per cent, various amounts of NaCl, ranging from 0.05 to 0.6 per cent, were added. To 100 grams of soil 20 grams of solutions were added. After the plants had grown considerably and the soil moisture was nearly exhausted, the cultures were placed in a special drying chamber of relative humidity of 0.1. Soil was tested for contained moisture when the foliage began to wilt, and when it showed drying. The remaining water was essentially the same regardless of the amount of salt present. Assuming that none of the salts are absorbed by the plants, BOVIE finds that the soil water, at the close of the experiments, in some cases would contain more than 300 per cent of salts, and that much of it must be in the solid form in spite of greatly increased solubility in the thin water films. He also offers some evidence for the movement of water in soils of low water content in the form of vapor, a thing already emphasized by various workers.—WILLIAM CROCKER.

Transpiration stream.—ZIJLSTRA¹⁴ finds that lowering the temperature of sections (20 cm. in length) of stem of intact plants to 0° C. for several days, even under the most favorable conditions for transpiration, does not lead to wilting of the foliage. It is assumed that this renders the living cells of the zone comparatively inactive, without injuring them and without producing injurious or blocking material. The results are contrary to those obtained by the same method by URSPRUNG, who used the results as an argument for the necessity of the activity of living cells to the continuity of the transpiration stream. ZIJLSTRA also conducted a number of experiments on the movement of 0.1 per cent *Säureviolett* (GRÜBLER) in living and dead stems. He also

¹³ BOVIE, WILLIAM T., The effects of adding salts to the soil on the amount of non-available water. Bull. Torr. Bot. Club 37:273-292. 1910.

¹⁴ ZIJLSTRA, K., Contributions to the knowledge of the movement of water in plants. Reprint from Koninklijke Akad. Wetenschappen te Amsterdam. 1910:574-584.